

**MURIFERELLA, A NEW GENUS OF LOWER DEVONIAN  
SEPTATE DALMANELLID**

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**Abstract**

*Muriferella* is proposed as a new genus of septate dalmanellid known from the late Lower Devonian of southeastern Australia, Nevada, and Arctic Canada. The new genus belongs to the Schizophoriidae and was derived from the widespread Silurian to Lower Devonian draboviinid genus *Salopina*. A new species, *Muriferella masurskyi*, from the Cortez Mountains of central Nevada, is described and selected as type species of *Muriferella*. A previously named species, *Phragmophora punctata* Talent, from the Emsian of Victoria, southeastern Australia, is assigned to the new genus.

Septate dalmanellids are a polyphyletic morphologic group as indicated by the presence of septate brachial valves recognized in several distinct dalmanellid lineages. Septation is not recommended as a basis for suprageneric taxonomy.

**Introduction**

Small septate dalmanellid brachiopods compose a relatively uncommon morphologic group of shells that have most commonly been recorded from rocks of Middle and early Upper Devonian age; the amount of available information regarding their distribution and phylogenetic relations has been inconsequential with the exception of Cooper's valuable contribution (1955). The first septate dalmanellids older than Middle Devonian were described by Havlíček (1953) under a new generic name *Prokopia*. The first Australian Lower Devonian septate dalmanellids were described more recently by Talent (1963, p. 60) as *Phragmophora punctata*. At the time it was clear that Talent's specimens did not belong to *Phragmophora* in the strict sense and the various points of difference were enumerated (Talent 1963, p. 61), but the scarcity of well preserved material together with the general lack of information about septate dalmanellids dictated a conservative approach.

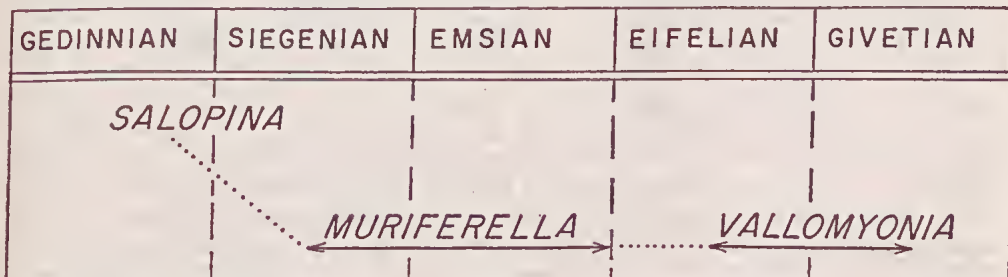


FIG. 1.—Range and suggested derivation of *Muriferella* and *Vallomyonia*.

During the course of study of large septate dalmanellids described elsewhere by the writers under a new subfamily name Cortezorthinac (Johnson & Talent 1967), small septate dalmanellids were discovered in the Lower Devonian of central Nevada and the Canadian Arctic that are congeneric with Talent's '*Phragmophora punctata*'. The new generic name *Muriferella* is now proposed for this taxon which proves to be a derivative of the widespread small aseptate dalmanellid *Salopina*, most common in the Silurian and Lower Devonian.

### Systematic Palaeontology

#### PHYLUM BRACHIOPODA

#### Suborder DALMANELLOIDEA

#### Superfamily ENTELETACEA Waagen, 1884

#### Family SCHIZOPHORIDAE Schuchert & Le Vene, 1929

#### Subfamily DRABOVIINAE Havlíček, 1950

#### Genus *Muriferella* n. gen.

TYPE SPECIES: *M. masurskyi* n. sp.

DIAGNOSIS: Like *Salopina* but with a long, low median septum in the brachial valve.

DISCUSSION: *Muriferella* is a small unequally biconvex dalmanellid with a sulcate brachial valve and with hollow radial costellae on the exterior. Internally there are well developed dental lamellae enclosing a short, triangular, ventral muscle suture. The brachial valve bears elevated cylindrical sockets floored by fuleral plates. The brachiophores are connected by supporting plates to the base of the valve as in *Salopina* although they commonly diverge a little more anteriorly than is common in *Salopina*. This is not surprising since in the probable ancestor of *Salopina*, *Fascifera*, as well as the closely allied genus *Pionodema* (Boucot, Johnson, & Walmsley, 1965, p. 332), the tendency for strong anteriorly divergent brachiophore supporting plates is better developed than in younger forms assigned to the Draboviinae. The cardinal process is simple to bilobed and is situated on a notothyrial platform that may be a thick callosity, or which may consist essentially of ancillary struts. A median septum originates at about the base of the cardinal process and extends to the anterior margin or nearly so, but is not high and triangular. All of the specimens investigated show only a slight increase in height of the median septum in the anterior direction.

COMPARISON: *Muriferella* differs from most Draboviinae, including *Salopina*, to which it is closest morphologically, by the presence of a median septum. Some species of *Salopina*, such as *Salopina* cf. *crassiformis*, develop a long, low median ridge that may reach to the anterior margin (Pl. 9, fig. 15), but many free brachial valves of this species in a number of collections in Nevada show considerable variation in the length and strength of the ridge. None develop the proportions of a septum, i.e. with the height two to three or more times the width of the structure. All other septate dalmanellids known at the present writing bear high triangular median septa which at once distinguishes them from *Muriferella*. In addition, *Prokopia* Havlíček and *Phragmophora* Cooper differ further by lacking fuleral plates. *Monelasma* Cooper (1955, Pl. 11D), which resembles *Muriferella* to some extent, has a high triangular median septum, but differs in addition by having relatively long, bilobate, diductor impressions in the pedicle valve. *Hypsomyonia*, *Kaysarella*, and *Mystrophora* all have elevated muscle platforms or cruralia in the brachial valve unlike the simple muscle bounding ridges around the dorsal adductor



scars of *Muriferella*. The septate dalmanellid that appears closest to *Muriferella* is the recently proposed *Vallomyonia* Johnson (1966, Pl. 23, figs. 1-17), but *Vallomyonia* bears a high, triangular median septum. Furthermore, its dental lamellae are very small, thin, and apparently incipient. In addition the fulcral plates are mere vestiges seen in the smallest specimens and very difficult to detect in larger ones. In addition, the dorsal muscle pattern, which in small specimens is essentially identical with that of *Muriferella*, differs in larger ones the size of larger specimens of *Muriferella* (e.g. Pl. 9, fig. 6) by having scalloped, somewhat elevated margins, something that is not developed in *Muriferella*.

**PHYLOGENY:** Because of the very close internal and external resemblance of *Muriferella* to *Salopina*, especially the well developed fulcral plates and brachio-phore supporting plates and the typical hollow costellae that are known in *Salopina*, there appears to be a high probability that *Muriferella* was derived from *Salopina*. The stratigraphic relations support this conclusion since *Salopina* is common throughout the Silurian and extends at least as high as the Siegnian in the Lower Devonian. Among the younger species of *Salopina* there is the abundant occurrence of *Salopina* cf. *crassiformis* in the Gedinnian in Nevada (Pl. 9, figs. 15-27) which commonly has a long median ridge in the brachial valve that may extend even to the anterior margin, and long subparallel adductor bounding ridges, two features that especially characterize Kozłowski's species. Among the species known to the writers at present, through the investigations of Walmsley, Boucot, and Harper (in prep.), *Salopina crassiformis* appears to be the most logical ancestor for *Muriferella*.

Morphologic comparisons and stratigraphic occurrence also support the probability that *Muriferella* gave rise to *Vallomyonia*, probably some time in the Eifelian; the latter genus occurs in the Eifelian and lower Givetian in central Nevada. The development of *Vallomyonia* is accompanied by reduction in the size of the dental plates and by increase in the height of the median septum to a large, triangular, blade-like structure. In addition, the dorsal adductor muscle bounding ridges tend to become relatively prominent in the brachial valve of *Vallomyonia*.

As pointed out by Johnson (1966, p. 159), *Vallomyonia* may be the ancestor of *Hypsomyonia* Cooper. In fact the two genera differ essentially by the full development of elevated muscle bounding ridges to form a somewhat platform-like structure in the brachial valve.

Wright (1965, p. H339) proposed the family Hypsomyoniidae to include the single genus *Hypsomyonia* Cooper, thus isolating it from other septate dalmanellids, but without a discussion of phylogeny to indicate probable relations. In view of the synthesis proposed by the writers to represent the phylogeny of *Salopina Muriferella*, *Vallomyonia*, to *Hypsomyonia*, it appears that Hypsomyoniidae should be discarded in favor of inclusion of *Hypsomyonia* in the Draboviinae. The nomenclatural simplification attending this proposal seems desirable since the development of a median septum is certainly polyphyletic. It appears to have arisen at least twice in the Draboviinae, i.e., once in *Monelasma* which possibly originated independently out of *Salopina*, or more likely out of *Sphenophragmus* as noted by the writers elsewhere (Johnson & Talent, 1967). A median septum is present in a dalmanellid closely allied to *Resserella* in the Silurian in specimens shown to us and being described by Norman Savage and by C. W. Harper. We have elsewhere described a lineage of isorthid brachiopods that developed a median septum some time in the Early Devonian; these have been assigned to the new subfamily Cortezorthinae embracing both septate and aseptate dalmanellids originating in the Silurian. Furthermore, at the moment, we see no really close association between the group under discussion here and either *Prokopia* and *Phragmophora* or *Kaysarella* and

*Mystrophora*. It appears therefore that the median septum in dalmanellids was derived independently three or four times in the Silurian and Devonian.

The muscle platform of *Hypsomyonia* is certainly not a unique feature since variations of it are also present in *Kayserella* and in *Mystrophora* and in a new genus from the Lower Devonian of New South Wales, related to the latter two, shown to us by Norman Savage. Furthermore, consideration of phylogeny tends to diminish the importance of this character.

It is anticipated that as our knowledge of septate dalmanellids in the Silurian and Devonian increases, the proposal of subfamilies and families for what now appear to be aberrant structures would require numerous relatively ineffectual divisions of several distinct lineages, principally in the Lower and Middle Devonian. For this reason we recommend inclusion within the Draboviinae of the lineage culminating in *Hypsomyonia*.

**DISTRIBUTION:** Both species described here, *Muriferella masurskyi* and *Muriferella punctata*, are from the Emsian, from Nevada and Victoria respectively. In addition, Johnson has seen specimens sent by Dr Alfred C. Lenz from the *Mono-graptus yukonensis* zone of probable late Siegenian age (Boucot, *et al.*, 1966). The *yukonensis* zone specimens are very small, not reaching a size commonly seen in *M. masurskyi*, and have relatively strongly convex braehial valves that contrast with the somewhat flatter ones of *M. masurskyi*, but in internal characters the two are very similar. Johnson has also seen specimens in two collections (GSC loes. 59036 & 67145) made by Dr J. W. Kerr from near the top of the Stuart Bay Formation on east-central Bathurst Island in the Canadian Arctic. Thus the known geographic range of *Muriferella* extends in an arc around western North America from Nevada to the Arctic Islands, plus an occurrence in Australia. The North American distribution is very similar to that of a number of other Lower Devonian genera studied by Johnson, such as septate members of the Cortezorthinae (Johnson & Talent, 1967), the pholidostrophiid *Phragmostrophia* (Harper, Johnson, & Boucot, in press), and the chonetid genus *Parachonetes* (Johnson, 1966b). The range of the septate cortezorthinids and *Phragmostrophia* also extends to Novaya Zemlya as noted in the papers cited above. *Parachonetes* has a broader range, is also present in Australia and at numerous Lower Devonian localities in eastern Europe and Asia, so the occurrence of *Muriferella* in Australia may indicate a somewhat broader distribution pattern more like that of *Parachonetes*. The cortezorthinid dalmanellid *Reestonia* and the pholidostrophiid *Nadiastrophia*, both described and illustrated earlier by Talent (1963), indicate some affinity with Arctic and western North American faunas, although these latter two taxa are distinct enough to receive separate generic names.

The stratigraphic range of the known species, named and unnamed, discussed above, appears to fall within the latest Siegenian and the Emsian (Fig. 1). The proposed phylogeny suggests that *Muriferella* gave rise to *Vallomyonia* some time in the Eifelian, but as yet no early Eifelian occurrence of either genus is known, so their full ranges are still to be determined. *Muriferella* itself seems so close to Gedinnian *Salopina* that occurrences may be discovered later to extend the range of the genus down even into the Gedinnian.

#### *Muriferella masurskyi* n. sp.

(Pl. 9, figs. 1-14)

1965 *Mystrophora* cf. *M. areola* Merriam in Gilluly & Masursky, p. 32, not Quenstedt.

**DIAGNOSIS:** Relatively large *Muriferella* with low dorsal interarea and thick median septum extending to the anterior margin.



**EXTERIOR:** The species attains a relatively large size with specimens having a maximum width between 7 and 11 millimetres across fairly common. The valves are unequally biconvex in lateral profile with depth of the pedicle valve exceeding that of the brachial valve by two or three times. The brachial valve convexity is poorly developed because of the presence of a well marked angular median sulcus that is relatively narrow posteriorly, but broadens in width, though not much in depth, toward the anterior margin. The pedicle valve is smoothly rounded to very faintly subcarinate in cross-sectional outline so that the anterior commissure approximately parallels the hinge line or may be slightly reentrant medially. The hinge line is short and straight and slightly exceeds half the maximum width to as much as about two-thirds the maximum width. The ventral interarea is flat and triangular, but may be slightly curved at the beak. It is, in general, relatively steeply apsacline and is cleft medially by an open triangular delthyrium encompassing an angle of about 30 degrees. The ventral beak is short and the umbo not prominent. The dorsal interarea is low, only faintly triangular, flat, and anacline, approaching but not reaching the orthocline position in some larger specimens. The maximum width is generally attained near midlength of the pedicle valves across the decidedly transverse subquadrate or suboval outline.

The exterior is covered with numerous fine rounded costellae that increase in number anteriorly by bifurcation and by implantation.

**INTERIOR OF PEDICLE VALVE:** The hinge teeth are stubby triangular projections diverging a little more widely laterally than the inner edges of the delthyrium and projecting dorsally in the plane of the ventral interarea. They are joined basally by short, commonly thin, plate-like dental lamellae that bow laterally in some specimens, descend directly in subparallel fashion in others, and diverge very slightly toward the base of the valve in still others. They enclose a short triangular muscle field with the adductor and diductor scars not separately differentiated. The anterior margin of the muscle field is commonly marked by a low transverse ridge, or the anterior may blend almost imperceptibly with the interior of the valve. The valve margins are crenulated peripherally by flat crenulations separated by narrow groove-like interspaces.

**INTERIOR OF BRACHIAL VALVE:** The brachiophores are triangular and prism-like, directed anteroventrally and diverging in that direction. Basally they thin and become plate-like and join the floor of the valve. In specimens where the cardinalia are relatively thin the plate-like, basal portions of the brachiophores diverge anteriorly at about the same angle as the ventral edges and descend from them in a subparallel fashion towards the base of the valve. The sockets are cylindroidal grooves defined lateral to the brachiophores and basally by fulcral plates. In some specimens the area around the cardinalia becomes thickened with shell material so that the plate-like bases of the brachiophores and the fulcral plates become welded together. The cardinal process has a short, bilobate shaft lying at a low angle on the thickened notothyrial platform with its myophore facing posteriorly. The anterior base of the cardinal process shaft, or in some cases the thickened notothyrial platform, is continuous anteriorly with a stout low median septum that extends to the anterior margin. It increases only slightly in height anteriorly and is not high and triangular, but may reach to a height three or four times its thickness. The bases of the brachiophores continue anteriorly as long, low, subparallel, adductor muscle bounding ridges that commonly extend well past mid-length. Some variation in the development of muscle bounding ridges exists so that the overall pattern may be elongate-oval or there may be a pair of indentations at the point of joining between the

posterior and anterior pairs. In a few specimens, particularly the larger ones, the adductor bounding ridges become disjunct from the brachiophore bases which then lie slightly within them, as in *Salopina*. The anterior margins are crenulate in a similar fashion to those of the pedicle valve, but a few specimens show the development of peripheral radial septa developed medially, adjoining the median septum.

COMPARISON: *Muriferella masurskyi* differs from *M. punctata* in being larger, commonly about twice the width, and in having thicker shell substance, the latter distinction being clear-cut even when comparing specimens the same size as those available of *M. punctata*. In addition, the dorsal interarea of *M. punctata* is steeper, higher, and decidedly more prominent. The dorsal median septum of *M. masurskyi* is thicker than in *M. punctata* and reaches to the anterior margin, the latter condition being uncommon in the Australian species.

OCCURRENCE: *Muriferella masurskyi* is present at the following two USNM localities in the *Eurekaspirifer pinyonensis* zone of Nevada.

10752—Wenban Limestone, east slope of Cortez Range, elev. 7950', 1000' N., 700' W. of SE. cor. of sec. 4, T.26N., R. 48E., Cortez quad., Eureka Co., Nevada. Collectors: A. J. Boucot and E. F. Lawrence, 1963; A. J. Boucot, H. K. Erben, and K. L. Gauri, 1965.

10754—Wenban Limestone, west slope of Cortez Range, elev. 6875', 800' N., 2900' E. of SW. cor. of sec. 21, T. 26N., R. 48E., Cortez quad., Eureka Co., Nevada. Collectors: A. J. Boucot and H. Masursky, 1963.

FIGURED SPECIMENS: USNM 141442-141449. The holotype is USNM 141442 illustrated in figs. 1-5 of Pl. 9.

### *Muriferella punctata* (Talent 1963)

(Pl. 10, figs. 1-13)

1963 *Phragmophora punctata* Talent, p. 60, Pl. 28, figs. 1-37; Fig. 21.

DISCUSSION: In addition to the remarks originally made by Talent when first describing this species (1963, p. 60, 61) several other points may be brought out here. The external radial ornament is found to consist of hollow costellae (Pl. 10, fig. 11). The interarea on the brachial valve is relatively well developed, flat, triangular, and anaeline, and it commonly extends ventrally covering the posterior ends of short sockets whose bases are defined by stout but short furler plates. The brachiophores themselves are relatively sharply triangular and are supported by thin brachiophore supporting plates that continue smoothly anteriorly as ridges laterally bounding the area of the adductor impressions. The notothyrial platform mentioned by Talent appears to be formed by a pair of ancillary struts (Williams & Wright 1963, p. 9). The base of the cardinal process continues anteriorly without interruption into the median septum which is thin and low through its entire length. In some specimens the median septum becomes somewhat elevated anteriorly, but does not become high and triangular as in some small dalmanellids such as *Prokopia*, *Mone-lasmina*, or as in the mystrophorids. The median septum commonly terminates somewhat short of the anterior margin of the valve, but may extend a little further anteriorly than its anterior-most point of connection with the floor of the valve.

FIGURED SPECIMENS: Geol. Surv. Vie. numbers 55962F, 56008, 56007B, 56007C, 56045A. USNM numbers 140448-140450.

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of *Muriferella masurskyi* from the Cortez Range, central Nevada, to Drs D. J. McLaren and J. W. Kerr of the Geological Survey of Canada for the loan of unnamed specimens of *Muriferella* from Bathurst Island, and to Dr A. C. Lenz of the University of Western Ontario for the loan of unnamed specimens of *Muriferella* from the *Monograptus yukonensis* zone in Yukon Territory. We are further indebted to Mr Kazys Kemežys for discussion of related brachiopods during an early stage of the preparation of the present paper, and to Mr Norman Savage for photographs and information about septate resserellids and the new Lower Devonian septate shell from New South Wales related to *Mystrophora* and *Kayserella*. The writers would also like to extend their thanks to Drs Walmsley, Boucot, and Harper for access to plates prepared by them dealing with the species of *Salopina*. Johnson's work at Pasadena was supported by a grant from the National Science Foundation to the California Institute of Technology supporting work on Silurian and Lower Devonian brachiopods, Grant No. 54034.

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### Explanation of Plates

#### PLATE 9

FIGS. 1-14—*Muriferella masurskyi* n. sp. *Eurekaspirifer pinyonensis* zone, Cortez Range, central Nevada, figs. 1-11, USNM loc. 10752, fig. 12, USNM loc. 10754. 1-5, Ventral, anterior, dorsal, posterior, and side views  $\times 4$ , holotype, USNM 141442. 6, Interior of brachial valve  $\times 6$ , USNM 141443. 7, 8, Plan and oblique views of interior of brachial valve  $\times 6$ , USNM 141444. Note pair of peripheral septa disposed anteromedially. 9, 10, Plan and anterior views of interior of brachial valve  $\times 6$ , USNM 141445. Note disposition of the brachiophore bases and of the presence of cavities lateral to them beneath the fulcral plates. 11, rubber mould of

interior of pedicle valve  $\times 5$ , impression of USNM 141447. 12, Interior of pedicle valve  $\times 7$ , USNM 141446. 13, Interior of brachial valve  $\times 6$ , USNM 141449. 14, Interior of brachial valve  $\times 6$ , USNM 141448.

- FIGS. 15-27—*Salopina* cf. *crassiformis* (Kozłowski, 1929). Upper Roberts Mountains Formation, beds of Gedinnian age, between Birch and Willow Creeks, northern Roberts Mountains, USNM loc. 12856. 15, Interior of brachial valve  $\times 10$ , USNM 155421. 16-20, Dorsal, anterior, side, ventral, and posterior views  $\times 10$ , USNM 155422. 21, 22, Anterior and plan views of interior of pedicle valve  $\times 10$ , USNM 155423. 23, 24, Interior and exterior views of brachial valve  $\times 10$ , USNM 155424. 25, 26, Exterior and interior views of brachial valve  $\times 10$ , USNM 155425. 27, Interior of pedicle valve  $\times 10$ , USNM 155426.

PLATE 10

- FIGS. 1-13—*Muriferella punctata* (Talent, 1963). Kilgower Member, Tabberabbera Formation, Victoria, Australia. Locality 35 of Talent (1963). 1-4, Three different aspects of dorsal interior, rubber replica  $\times 10$  and internal mould of brachial valve  $\times 7$ , Geol. Surv. Vic. 55962F. 5, Internal mould of pedicle valve  $\times 7$ , Geol. Surv. Vic. 56008. Note long anteriorly convergent vascular tracks. 6, Posterior view of internal mould of brachial valve  $\times 10$ , USNM 140448. Note the well developed slots which accommodated the fulcral plates. 7, Internal mould of brachial valve  $\times 7$ , Geol. Surv. Vic. 56007B. 8-10, Two aspects of dorsal interior, rubber replica  $\times 10$  and internal mould of brachial valve  $\times 7$ , Geol. Surv. Victoria 56007C. Note that the median septum is free anteriorly. 11, Mould of exterior  $\times 10$ , USNM 140449. Note the small rods of matrix in the grooves corresponding to the costellae owing to their hollow structure. 12, Mould of interior of pedicle valve  $\times 10$ , USNM 140450. 13, Internal mould of pedicle valve  $\times 10$ , Geol. Surv. Vic. 56045A. Note radial grooves at the venter anteriorly and the very numerous pip-like moulds of the endopunctae.